

The Bio of Biomechanics

An understanding of biomechanics will help coaches and players establish the styles and techniques that best serve their individual game.

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Many players aim to emulate Roddick's serve but success may depend on bio-mechanical details.

Who can name Newton's three laws of motion? As coaches, we have studied this area in our training and passed exams on this topic in order to become qualified - we even successfully apply these principles each time we coach. It is quite likely, however, that you cannot recall the correct terminology or define what they mean in the same words used by Sir Isaac Newton.

It is very easy for coaches and players alike to become overwhelmed by biomechanics - inertia of motion, linear and angular momentum, action and reaction, etc. It is also easy to become so consumed by the smallest details in creating the most biomechanically correct strokes that performance can actually suffer. However, this need not be the case.

So it is worthwhile taking a refresher on the basic functions of biomechanics in the game and consider some methods to achieve optimum biomechanical performance in our players.

The Role of Biomechanics

Biomechanics is quite simply the application of various mechanical principles (mechanics) to a living organism (bio). For example, each time we make our body move, our biology is affected through the chemical processes to create energy, and through the forces and strains they place on our joints, muscles, ligaments and tendons. The degree to which our biology, or physiology, is affected is proportional to the amount of movement - a larger number of muscles recruited, a longer duration of movement or a higher intensity of movement all produce a greater impact on our physiology.

Obviously tennis requires a considerable amount of movement - much of it highly repetitive, which creates a considerable strain on our body. Some of these strains are clear to us whilst we are playing (such as heart rate and breathing rate become faster, and we begin to feel hot and tired). Other strains are more apparent in the days following play (like muscle soreness). For some people, strains are also experienced as a result of a single movement (such as torn muscle or tendon) or many years of repetitive movements (e.g., overuse injuries). All of these situations have negative implications on performance or overall health and wellbeing. However, this certainly should not cause anyone to hang up their racquet.

The good news is that whilst the amount of strain is proportional to the amount of movement, it is disproportional to efficiency. Therefore, a player's mechanical efficiency should be enhanced in order to minimise the strain on the body and have the following beneficial effects:

- Less fatigue for a given exercise, duration and intensity
- Greater force production for a given movement
- Faster recovery time between training sessions or matches

